

**Motorola
SM56 Modem**

Quick Start User's Guide

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1 Overview

This document helps the OEM, system integrator, VAR, and end user with host system selection and proper modem hardware and software installation. It lists qualified personal computer systems, and explains proper modem usage. This document helps you select CPUs, and it explains the tradeoffs associated with different processors. It explains the use of the SM56 Data/Fax/Voice modem with various sound card configurations. It also aids you in troubleshooting and testing the SM56 equipped system.

2 Introduction

Motorola's SM56 Modem is a feature-rich modem at an attractive price. It provides high-speed communications between your personal computer and a remote location, such as an Internet Service Provider (ISP), so you can:

- Receive data at up to 56 Kbps in V.90 or K56flex modes
- Get automatic fallback to V.34 (33.6 Kbps) rates in bad line conditions and on non-V.90/K56flex headends

- Use your computer as a **telephone answering** machine (TAM)
- Send and receive faxes on your personal computer at rates up to 14.4 Kbps
- Use your computer as a **video phone** to place and receive video phone calls (Data/Fax/TAM/Speakerphone modem with video equipment)
- Use your computer to conduct hands-off speakerphone **voice calls** (Data/Fax/TAM/Speakerphone modem)

Important

The SM56 ISA modem runs on Windows 95, Windows 98, and it can be used by applications that run in an MS-DOS box (under Windows 95/98). Windows 95 and Windows 98 use the same modem software.

The SM56 PCI modem also runs on Windows 95 and Windows 98. It does not directly support Windows 95/98 DOS box applications. Refer to the Troubleshooting section for information on a third party COM port virtualizing/trapping application that allows the SM56 PCI modem to be used with DOS box applications.

Personal-computer OEMs that bundle the SM56 can benefit from sizable cost reductions, hardware reduction, and lower power consumption. End users benefit from quick, easy and affordable software upgrades, which help them keep current with the latest communications technology.

Please check with your direct modem supplier for the latest software updates and other product information.

3 Personal Computer Requirements

Motorola performs rigorous, exhaustive testing on its modems. It has developed a list of recommended personal computer features that perform well with the SM56. The information includes qualified CPUs, Level 2 cache requirements, operating systems, RAM requirements, and third-party sound card compatibility. However, in today's dynamic technology markets, it is not possible to test *all* components and combinations on *all* systems.

This section outlines minimum system requirements for SM56 operation. On these systems, CPU loading was found to be acceptable and the modem demonstrated good performance over the entire network model.

Important: SM56 operation is *not limited* to the personal computer systems listed here.

Recommended CPUs

The SM56 modem has been qualified (tested for processor loading and TSB network model coverage) on the following processors:

- Intel Pentium, 150MHz with MMX, 256K Level 2 (L2) cache
- Intel Pentium, 200MHz, 256K L2 cache
- Intel Pentium II
- Intel Pentium Pro

- Intel Celeron (Pentium II, 266MHz, no L2 cache)

The SM56 functions satisfactorily on the following systems. However, it has not been fully qualified (it was not tested for processor loading or TSB performance):

- AMD K6, 233 MHz, 256K L2 cache
- AMD K6-2, 256K L2 cache
- Cyrix 6x86MII, 266MHz, 256K L2 cache

The SM56 does not function on the following CPUs, whose floating-point performance is insufficient:

- Cyrix MediaGX
- Cyrix MediaGXM
- Cyrix 6x86

Level 2 Cache Benefits

Level 2 (L2) cache is an instruction memory (SRAM) bank that resides outside the CPU core. It holds many instructions close to the CPU, to reduce the need for the processor to use slow access cycles fetching instructions from main memory (DRAM). Eliminating most CPU accesses to main memory considerably improves overall system performance.

The SM56 Software Modem works best when a minimum of 256K L2 Cache is installed on the computer system motherboard to minimize processor loading. Intel's Celeron (266MHz PII) systems do not have L2 cache. Although the SM56 operates on those systems, host processor loading increases in the absence of L2 cache.

Compatible Operating Systems

The SM56 modem will run on the following operating systems:

- Windows 95 (OEM Service Release 2.0 or later)
- Windows 98
- DOS Box under Windows 95/98. Note that the SM56 PCI modem does not include direct DOS box support. Refer to the Troubleshooting section for information on working around this limitation.

System RAM Requirements

The SM56 Modem operates on systems that have the minimum RAM required by the installed operating system. As with L2 cache, the more main memory, the better. The recommended RAM is twice the required minimum. This reduces slow hard-disk swapping and improves overall system performance... especially when executing numerous concurrent processes. The minimum RAM requirements are:

Windows 95/98	16 MB
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4 Preparing the Computer for SM56 Installation

To ensure problem-free installation of the SM56 modem, ensure that an IRQ is available, as follows.

1. In Win95/98, open the Control Panel.
2. Double click the **System** icon.
3. Select the **Device Manager** tab.
4. Highlight the **Computer** icon.
5. Select the **Properties** radio button.
6. Ensure that the **Interrupt Request (IRQ)** radio button is selected.

This displays the IRQ lines that are in use on the computer. Available lines are *not* shown in the list. To install the SM56 ISA modem hardware, interrupt line 3, 4, 5, 6, 7, or 9 must be available. The PCI SM56 software modem can use an IRQ in the range 3 through 15.

If there is no IRQ line available for the SM56 disable one of the COM ports in the BIOS.

Note: If you are using a Windows 95/98 DOS box application, the modem requires two IRQs. Refer to the Troubleshooting section in this document, or to the on-line *User's Guide* for more information on DOS application support. You can access the *User's Guide* through the modem Control Panel.

Important: The SM56 PCI modem does not directly support DOS box applications. Please refer to the Troubleshooting section for information on how to get around this limitation.

To ensure that COM Port 2, 3, or 4 is available, you can use the following steps:

1. Open the Windows Control Panel.
2. Double click the **System** icon.
3. Choose the **Device Manager** tab.
4. Highlight the **Ports (COM and LPT)** branch.
5. Expand the branch to see which ports are installed on the computer.

To install the SM56 ISA modem so that it is accessible through older application software and DOS programs, COM port 2, 3, or 4 should be available. If none of these ports are available, you must disable one of the COM ports in the BIOS.

5 Understanding Sound Card Compatibility and Installing Modem Hardware

Before discussing line interface card installation, let's review the optional sound card connections for SM56 Data/Fax/TAM/Speakerphone modems. Recall that SM56 Data/Fax/TAM modem does not support the sound subsystem.

Sound Card Compatibility:

The SM56 requires a sound card to use its speakerphone (Data/Fax/TAM/Speakerphone modem). The Data/Fax/TAM modem requires the sound card for local message playback which occurs through the host PC bus. There are typically no TAPI connectors or jacks provided on Data/Fax/TAM modems boards.

There are two methods of interfacing the Data/Fax/TAM/Speakerphone modem to a sound card:

- TAPI connector
- On-board microphone and speaker jacks

TAPI Connector

Using the on-board TAPI connector requires a sound card that also has a TAPI-style connector, which has pins that provide analog microphone output and speaker input connections. Many sound cards have one or more CD or auxiliary connectors, but these do not provide the required microphone output for the SM56 modem. To ensure compatibility, check the sound card specifications; one connector must provide a microphone output as well as a speaker input.

Make or buy a cable that routes SM56 signals to the sound card correctly. Locate the 4-pin header connector on the SM56 card. The SM56 connector pin-outs are as follows.

SM56 Pin	Signal
1	Ground
2	Microphone In
3	Ground
4	Speaker Out

Make sure the audio header on your sound card corresponds to this pinout. If it does not you will need to use cross-over cables to connect the correct signals together.

On-Board Microphone and Speaker Jacks

If the sound card does not provide a TAPI-style connector, you can connect the SM56 modem to the sound card by optional on-board microphone and speaker jacks. Ask your modem maker for a board with this option. The microphone jack allows for the direct connection of a microphone to the SM56 modem card. The sound card also has a microphone input.

- To use speakerphone applications with the modem, connect your microphone **to the microphone input jack on the SM56 modem card**. You can then talk into your microphone and hold a conversation with the remote party.

- To record audio (such as a voice mail greeting) on the personal computer, attach the microphone **to the microphone input jack on the sound card**. Also, some applications may support audio recording through the modem jacks, e.g. Bitware.

You may be able to create a special cable or use a T-splitter to connect one microphone to the input on the modem *and* the sound board simultaneously.

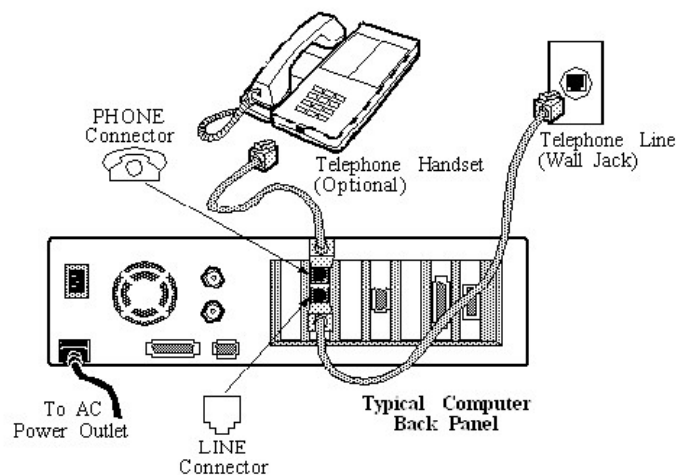
The speaker output jack on the line interface cards can be used in one of two ways:

- To directly connect powered speakers to the speaker output jack.
- To connect the SM56 speaker output jack to the sound card line-input jack (this allows the speakers to remain plugged into the sound card).

Hardware Installation:

Install the modem card as follows.

1. Power down the personal computer.
2. Locate a vacant bus connector (ISA or PCI, depending on your hardware) and insert the modem card.
3. If using the SM56 Data/Fax/TAM/Speakerphone modem, connect the sound subsystem interface cable(s) to the modem card (via the internal TAPI connector or using the audio jacks -- refer to the information above on sound card compatibility.)
4. Connect the modem **Line** input to an analog phone jack using an RJ-11 phone cable. Optionally, connect a telephone handset to the **Phone** input on the line interface card. The external telephone cable connections are as follows.



5. Replace the personal computer cover and power the personal computer on.

6 Installing SM56 Software on Windows 95/98

ISA Slots

The SM56 line interface card for ISA is Plug and Play compatible. The ISA modem requires a block of 16 contiguous I/O addresses, one free interrupt request line (DOS support also requires a second interrupt request line), and a COM port number. The acceptable I/O addresses for the SM56 are 100 to 3FF (hex), starting on zero-byte boundaries. The SM56 for ISA can access interrupt request lines 3, 4, 5, 6, 7 and 9.

PCI Slots

The SM56 for PCI is PCI Plug and Play compliant. It requires one IRQ (IRQ 3, 4,...15) and one memory mapped base address.

Windows 95/98 assigns the modem a COM port number. The SM56 installation software attempts to negotiate a COM port number in the range of 1-4 in order to support older software and DOS games. Note that the SM56 PCI modem does not include direct DOS box support. Please refer to the Troubleshooting section for information on how to get around this limitation.

Installing on Windows 95/98

(**Note:** The Install Wizard may vary slightly with different versions of Windows 95 and Windows 98.)

On starting Windows 95/98 for the first time after installing the SM56 (ISA or PCI) line interface card, the Windows 95/98 Configuration Manager detects the new hardware, assigns resources to it, and then displays a window requesting the modem software drivers. This indicates that the Configuration Manager is looking for the information (INF) file, which contains information about the modem, including device type (Modem), device driver information (the name of the driver that will control the modem) and the AT command/response sets that it supports.

In response to the request window, insert the distribution CD-ROM that contains the SM56 installation software. Select **Driver from Disk Provided by Hardware Manufacturer**. Windows should find the information on the disk and identify the device as the SM56 Modem Line Interface Card. It copies the files from the install disk to the computer.

Note: The SM56 install program will display a message box that reports *Cannot locate file inst32.ex* ... If this occurs, browse and re-point the path to the SM56 installation CD ROM again. Then click **OK**.

On boards that have voice capabilities (SM56 Data/Fax/Voice models), another device is found after the modem has been installed. Windows notifies you that it has found a Serial Wave Device for the modem and prompts for a Wave Device driver. Re-point Install Shield to the SM56 distribution disk, and click **OK**.

When these two devices are installed, the SM56 Modem Setup program runs.

SM56 Modem Setup for PCI

The modem setup program for PCI does not prompt for user input during installation. It defaults to **USA** country code and **Domestic English** as the language for the Help files. If you wish to change either of these settings you may do so via the SM56 PCI Control Panel application (see [Verifying Correct SM56 Installation](#) section) after setup is complete. Also, for SM56 Data/Fax/TAM/Speakerphone modems the microphone and speaker gain selections are done via the Control Panel application (under the **Advanced** tab). The SM56 PCI Data/Fax/TAM only modem does not have a Microphone/Speaker Gain selections.

SM56 Modem Setup for ISA

The setup program for ISA includes the following.

1. A prompt for the OEM name and phone number. (This information will display in the modem Control Panel.)
2. A prompt for the country of installation. Select a country from the list that appears. Proper modem operation is guaranteed only if you specify the correct country. The SM56 software has been designed for country-specific characteristics for dial tone, ringback tone, busy tone, Caller ID format, and compansion protocol-- μ -Law or A-Law.
3. A prompt for a language. Select a language from the list that appears.
4. For Data/Fax/Voice modems: a prompt for the microphone gain. The gain is applied to the microphone signal that is received at the TAPI connector or the microphone input jack of the SM56 line interface card. The microphone gain amplifier output drives directly into the voice CODEC on the modem board. The total microphone voltage to the CODEC should not exceed its safe operating area (SOA), which is +0.5V to +1.0V (2.5V peak-to-peak maximum). Many sound cards (to which the microphone is normally connected) include their own microphone pre-amplifier stage. To determine this, check your sound board documentation. The total microphone gain is approximately the sum of the sound board microphone gain and the modem supplied gain (selected in this window). The SM56 Install Shield provides the most common microphone gains: -2dB, +2dB, +5.6dB, and +28.4dB. If you are using a microphone connected directly to the microphone input jack of the SM56 line interface card, select a microphone gain of 28.4 dB.

Note: SM56 ISA Build 58 and later Country, Language, and COM port selections can be changed via the SM56 Control Panel application after modem install is complete.

Determining Microphone Gain Setting:

1. Determine whether the sound card has applied any gain to the microphone signal that is presented at its TAPI connector.
2. Use the gain found to determine the gain setting, as follows:

Sound Card gain	Use SM56 gain setting
0 dB - 7 dB	28.4 dB
7 dB - 22 dB	5.4 dB
22 dB - 28 dB	2 dB
28 dB - 40 dB	-2 dB

7 Verifying Correct SM56 Installation

Verify that the SM56 software and hardware installation was completed correctly as follows.

Verifying SM56 Software Installation

1. Verify correct COM port selection.

You can check COM port installation through the **Modems** icon in the Control Panel or through the **SM56** Control Panel application (see below). Normally, the SM56 will install on COM2, COM3, or COM4. Sometimes, however, depending on your computer system setup or Windows setup, the SM56 may install on COM5 (or higher).

Although the modem functions correctly on COM5, many Internet Service Provider (ISP) software applications (such as AOL) do not work if the modem is on a COM port number higher than COM4. If the SM56 installs on COM5 (or higher), refer to the Troubleshooting section for assistance.

2. Run simple diagnostic from the SM56 Control Panel.

The SM56 software modem provides an informative Control Panel that reports:

- Modem status: in use/not in use; dialing; negotiating a connection; actual connect rate (updated in real time during a connection)
- A button to access the on-line *User's Guide*

The SM56 Control Panel program also provides access to two Windows components:

- COM port and IRQ information
- A diagnostic utility that sends the modem ATI commands and displays the results: software build, modem type (DF or DFV), and more.

To access the diagnostics option from the Control Panel, click **Properties**; select the **Diagnostics** tab; select the **SM56 Modem** from the list; and then click **More Info**. If the driver is properly installed, a dialog box appears, with responses to the ATI commands as shown in the example below. Refer to the AT Commands section in the on-line *User's Guide* for an explanation of ATI commands.

Verifying SM56 Hardware Operation

To verify correct SM56 modem card hardware operation (up to the isolation transformer), you can use the following loop back test procedure.

1. **Important:** Remove the telephone line connector from the modem card.
2. Select **Start**.
3. Select **Programs-->Accessories-->HyperTerminal**.
4. Double click the **Hypertrm.exe** icon.
5. Optionally, select a connection name and icon.
6. In the **Connect Using** window, select **Motorola SM56** modem.
7. Enter a number in the **Phone Number** box.
8. Select **Dial**.
9. Select **Cancel**.
10. Enter **AT <cr>**.
The response **OK** should appear.
11. Enter **ATS46 = 23 <cr>**.
12. Enter **AT&T1 <cr>** . Wait a few seconds.
13. Type some letters at the keyboard. If the hardware is functioning correctly, the letters you type appear on the HyperTerminal display.

8 Changing the Operating System

Windows 98 Upgrade Error Message

If the SM56 ISA modem is installed on a Windows 95 PC, and then the system is upgraded to Windows 98, the following error message appears when Windows 98 starts:

Duplicated device: vcd

To remove the error, edit the SYSTEM.INI file and locate the line that reads:

Device = *vcd

Delete this line. Save the modified SYSTEM.INI file and restart Windows 98. You will no longer get the error message.

This **vcf** device is used for Windows DOS box application only, and it not present in SM56 PCI softmodems. A later build will add DOS box support for the PCI soft modem.

9 Using the SM56 Modem

32-Bit Windows 95/98 Applications

Because 32-bit Windows 95/98 applications use TAPI for communicating with modems, using the SM56 is as easy as selecting the SM56 modem by name from the list of available modems.

16-Bit Windows 95/98 Applications

Because 16-bit applications cannot use the TAPI interface, there is a bit more setup needed.

1. Select **Motorola SM56** modem from the list of supported modems (if the SM56 modem is not shown, select **Hayes Compatible modem**).
2. Configure the application's COM port selection. Use the COM port assigned to the SM56 modem.
3. If the application requires it, enter specific AT commands for the SM56 modem. (For a full list of AT commands, refer to the SM56 on-line *User's Guide*). Some typical AT commands are listed below.

DOS-Based Applications and Games

Important: The SM56 PCI modem does not currently include direct DOS box support. Please refer to the Troubleshooting sections for information on a way to get around this limitation.

The SM56 ISA modem can be used by DOS applications *only* through a Windows 95/98 DOS box.

DOS support is achieved by virtualizing the standard I/O and IRQ assigned to a COM port. This means that the SM56 drivers capture and redirect all I/O to/from the standard I/O address for the COM port to which it assigned. In simpler terms, you tell the application the COM port of the SM56, and then use all the standard I/O and IRQ settings. Standard I/O addresses and IRQs for COM Ports 1-4 are as follows:

COM Port	IO Address	IRQ
1	3F8	4
2	2F8	3
3	3E8	4
4	2E8	3

To determine the SM56 COM port number, open the SM56 Control Panel and select the **Diagnostics** tab. The COM port number to which the SM56 modem is assigned is listed here. Configure your application to use this COM port. For example, if the SM56 modem has been assigned COM 3, configure your application to communicate through COM 3.

Enter the AT commands for the SM56 modem as required by the application. Some typical AT commands are as follows.

AT Commands Commonly Needed by Applications

Applications generally prompt for the following commands.

Initialization*	AT&F
Hangup	ATH0
Dialing string	ATDT
Answer string	ATA

*Some games require that the modem refrain from performing error correction and data compression. In these cases, use the initialization string **AT&F\N0**.

For a full list of AT commands, refer to the on-line *User's Guide*.

10 Un-installing and Upgrading the SM56 Modem

SM56 Un-Install Procedure

1. Open the Control Panel.
2. Select **Add\Remove Programs**.
3. In the dialog box, select **Motorola SM56 Modem Uninstall**.
4. Select **Add/Remove**.
5. When asked to close the Control Panel window do so to allow the SM56 Control Panel applet to be removed.
6. Shut down the computer.
7. Remove the SM56 hardware from the computer. (**Note:** If you do not remove the SM56 line interface card, the SM56 will be automatically re-installed when Windows 95/98 restarts.)

The SM56 modem software remains on the PC hard disk for later installs without needing a complete software install again. Simply install the modem card back in the PC (any vacant slot) and the software will automatically self-install. If you remove the PCI modem without first un-installing the software and later reinsert the board in a different slot the system will try to re-install a second instance of the modem...resulting in neither functioning. Make sure to **always** run the un-install utility **before** removing the line interface card from the PC.

SM56 Software Upgrade Procedure (Windows 95/98)

Upgrade the SM56 modem to a newer version as follows.

1. Obtain the latest software version from your **direct** modem supplier.
2. Run **setup.exe** and follow the Upgrade Wizard prompts. The upgrade utility retains a backup of your previous modem version in a folder called **Program Files\Motbak95**.

Recovering From an Unsuccessful Upgrade (Windows 95/98)

If, after an SM56 upgrade, you have problems with the new driver, you can restore your previous SM56 software installation as follows. Perform *all* of the following steps.

1. Open the Control Panel. Select **Add/Remove** programs.
2. If **SM56 Modem** is in the list of installed programs, click on **SM56 Modem**, then Click **Add/Remove** to run the un-install program.
3. Open the **windows\inf\other** folder. Delete all Motorola INF files that are listed there.
4. Edit the Registry and remove the following key if present:

HKLM-->System-->CurrentControlSet-->Services-->SM34DFV

5. Open the Control Panel and determine if the SM56 Modem Control Panel is there. If so, close the Control Panel; open the **windows\system** folder; and delete the **mca.cpl** file.
6. Open the **windows\system.ini** file. Search for **device = motvcd.vxd**. If it is present, change it to **device = *vcd**.
7. Restart the computer.
8. Upon restart, the **New Hardware Found** window appears. Browse to: **Program Files\Motbak95**.
9. Perform the SM56 software installation procedure (refer to Section 6 or 7). This will reinstall your previous modem software.

11 Troubleshooting

If there is a problem making or receiving a call or transmitting data, and your communications application does not explain the problem, check the following list of symptoms and tips.

- **The modem installs at COM 5 (or higher)**

Some ISP applications, such as America on-line, do not communicate with a COM port higher than COM4. If the SM56 installs on COM5 or higher, force the modem to a lower COM port as follows.

1. Open the SM56 Control Panel application.
2. Select the **Advanced** tab.
3. Click on the radio button for the desired COM port. Note that unavailable COM ports are grayed out and not selectable.

Note: For SM56 ISA modems Build 58 and later include this feature on the Control Panel applet. If using earlier builds, edit the **PortName** data in the Windows Registry **HKLM-->Enum-->ISAPNP-->nnnn**, where **nnnn** corresponds to the modem's plug and play ID. Change **PortName** data to the desired COM port. The changes take effect as soon as the Registry editor (REGEDIT) is closed. There is no need to restart the PC.

- **Windows 95/98 DOS box applications do not work with the modem**

1. The SM56 PCI modem does not directly support Windows 95/98 DOS box applications. If you are using the SM56 PCI modem you must use a third party application that traps and virtualizes the COM ports. One such application is provided by Pacific Commware, Inc. (Ashland, Oregon). They can be found on the Web at www.pacificcommware.com. The application is called **TurboCom/95 Pro**, and works on Windows 95 and Windows 98 platforms. Note that Motorola have not completely tested and qualified this product for SM56 DOS box support, but have verified basic functionality.
2. If using the SM56 ISA modem, open the Control Panel.
3. Double click the **System** icon.
4. Expand the **Modem** branch.
5. Double click the **Motorola SM56** modem.
6. Select the **Modem** tab. Make a note of the COM port number.
7. Select the **Resources** tab. Make a note of the IRQ number listed.
8. For DOS support to operate correctly, the SM56 modem cannot occupy the standard IRQ for the COM port number.
9. Uncheck the **Use Automatic Resources** check box.

Double click on the **Interrupt Request** label and change the IRQ to a different level that is not in conflict with another device. (If there is no free IRQ: free one, or change other device IRQ levels to free a non-standard IRQ).

- **There is no dial tone**

1. Ensure that the telephone cable is securely connected at both ends.
2. Unplug the telephone line cable from the computer, and connect it directly to a telephone from the wall outlet. Check for a dial tone. If there is none, the problem is in the telephone line or system. Call the service provider.

- **The modem cannot complete a connection to another modem**

1. Ensure that your modem is dialing the correct number. Ensure that you've specified the correct area code, if one is required.
2. Determine whether the remote modem is correctly configured to communicate with yours.

- **The modem does not answer incoming calls**

1. Ensure that the automatic answer parameter is set to one of the enabled options, using the ATSO command (ATS0=1 to answer after one ring, and so on).
2. Ensure that no other devices, such as fax or answering machines, are answering calls before the modem does.

- **The modem disconnects while transmission is in progress**

1. Ensure that the telephone cable is securely connected at both ends.
2. Ensure that call-waiting is disabled. In most areas, the command *70 or #70 disables call-waiting. Check with your telephone company for the correct key sequence. (With call-waiting, the incoming call's click sound may be disrupting your call.)

- **Data is not transmitted or received for unusually long periods of time**

Re-dial the call. (The telephone line connection may be poor.)

- **The computer runs slower than usual**

1. Close any open applications that you are not using.
2. For the SM56 for ISA only: try adjusting the modem's CPU Usage option from **High** to **Medium**; or **Medium** to **Low**. This is in the SM56 Control Panel application. This option is not available for the PCI modem.

- **You cannot enter tone selections successfully when calling tone-driven applications**

When dialing a remote system that requires you to enter selections using the telephone keys, such as a voice-mail depot or bank-account information provider, you can lengthen the duration of the tones your modem sends, so that the remote system can detect them better. To adjust DTMF tone length, use the AT+VTD n command, where n specifies the tone duration.

- **The modem does not respond to AT commands**

1. Ensure that your communications software is configured to use the same COM port as the modem's COM port.
2. Reset modem parameters to default options by entering AT&F; then re-enter custom options.
3. SM56 builds after Build 50 require setting the S46 register to 23 before AT&T1 will perform the Local Analog Loop(LAL) back hardware test.

- **The modem responds to commands, but they do not appear on the screen**

Ensure that the Echo option is enabled by entering ATE1.

- **You've installed a new peripheral device; now the modem does not work**

1. In the Windows desktop tray, select **Start**. The start menu appears.
2. Select **Help**. The **Windows Help Topics** window appears.
3. Select the **Contents** tab.
4. Select **If You Have a Hardware Conflict**.
5. A series of troubleshooting actions appears. Follow the appropriate sequence.

- **You hear feedback (noise) from the sound system (Data/Fax/TAM/Speakerphone only)**

1. Position the speakers at least three feet (1 M) away from the microphone.
2. Ensure that the speakers are facing away from the microphone.
3. Turn down the speaker volume.

4. Speak into the microphone at a distance of at least 12 inches (30 cm) from your mouth. Minimize background noise.
5. If there is still feedback, turn off the microphone boost, under the volume control panel.

- **The modem connects; then meaningless characters appear**

1. Open the **Control Panel**. Double click the **Modem** icon.
2. Select the **Motorola SM56** modem
3. Click on **Properties**.
4. Select **Connection**.
5. Click on **Advanced**.
6. Check the **Use Error Control-Required to Connect** box.

- **The modem cannot connect; the Error Control option is selected**

The modem may be connecting at a rate higher than appropriate for the line conditions.

1. Use the AT%B command to limit the SM56 maximum connection rate. (For a list of AT commands, refer to the on-line *User's Guide*.)
2. Lower the rate, using AT commands, until the problem is corrected. You can add AT commands to do this; refer to the next section .

How to Add AT Commands

1. Open the Control Panel.
2. Double-click the **Modem** icon.
3. Select the **Motorola SM56** modem.
4. Click on **Properties**.
5. Select **Connection**.
6. Click on **Advanced**.
7. In the **Extra Settings** box, add commands as needed.

12 Reporting Problems and Contacting the Modem Supplier

If you have a problem with the modem, ensure that the problem and its solution are not shown in the Troubleshooting section. If you cannot resolve it through troubleshooting, send the following information in an email to your **direct modem supplier**, so that they can reproduce and resolve the problem.

Information about your computer:

- Brand and model
- CPU type (Pentium, Pentium II, AMD, etc.) Specify if MMX
- CPU clock rate
- Amount of Level 2 cache memory
- Operating system and version (Windows 95 OSR revision level, Windows 98, etc.)

Information about your modem:

- SM56 modem card version; modifications to your SM56 modem card
- SM56 version number (find this with the **ATI3** command; or with the **More Info** button in the SM56 Control Panel)

Information about your setup:

- The telephone number you are calling from
- The telephone number you are calling to
- If performing a lab test, a detailed description of the equipment used
- The remote modem information

Information about the problem:

- The actions and steps that you performed
- A description of what you saw; be specific
- A description of what you expected to see

13 Understanding SM56 Windows Logo Certification

After rigorous testing at a Microsoft Windows Hardware Quality Lab (WHQL), the ISA bus-based SM56 software modem met the stringent qualifications to receive the **Designed for Microsoft Windows** logo. The PCI modem will be qualified later. The logo is targeted at commercially marketed desktop applications that run on the latest released versions of Windows 95, Windows 98, and Windows NT Workstation. It is not intended for client/server or Windows NT Server applications. The goals of the logo certification program are to improve Windows hardware and software quality, increase end-user satisfaction, and reduce support costs.

To receive the logo, a product must show proof of compatibility with Windows 95/98 *and* NT. The SM56 Software Modem passed the stringent tests to show that, among other capabilities, it:

- Installs and registers itself properly with the operating system
- Is reliably functional and stable
- Removes itself (minus its core components) using an automated uninstaller

- Supports Universal Naming Conventions (UNC) and Long File Names (LFN)

The modem also passed a host of other performance and feature-set tests of its data, fax, and voice modes.

What does the logo mean for the SM56 ISA modem? It means that Motorola and its OEMs, system integrators, and VARs can now use the Windows logo on their products and packaging, and on advertising, collateral, and marketing materials. This signals end users that the SM56 software modem is tested and fully functional on Windows 95/98 and Windows NT 4.0; that it is designed to provide optimum usability and compatibility; and that it takes advantage of the latest technologies provided by these operating systems. It makes users feel more comfortable about purchasing the product, and it assures them of more complete satisfaction while using it.

The Windows logo also means that the SM56 software modem is included on Microsoft's Windows Hardware Compatibility List (HCL) under "Logo," reinforcing to customers and end-users alike that it meets Microsoft's strict requirements and operates properly with Windows operating systems.

In summary, Windows Logo certification increases recognition and adoption of SM56 Software Modem technology worldwide. It demonstrates Motorola's long-term commitment to providing high performance, quality products.

14 An Overview of the V.90 Standard Protocol

In February 1998, the International Telecommunications Union (ITU) formulated the V.90 industry-standard protocol for 56K modems. Before the adoption of the V.90 standard, 56K modems complied with one of two pre-standard implementations: K56flex or X2 technology. Unfortunately for ISPs and end-users, these technologies were not compatible. ISPs had to worry about which standard to employ. End users had to be sure to purchase modems compatible with their ISP's equipment.

Upgrading Motorola's SM56 K56flex modems to V.90 is a software-only upgrade. There is no change to the line interface hardware. This makes it easy for pre-V.90 users to upgrade their system to V.90 compliance.

Note: sometimes V.90 is referred to as V.PCM. PCM is an acronym for Pulse Code Modulation. With V.90, high-speed downstream (from Internet to personal computer) data transmission is accomplished using PCM techniques. Before the ITU formulated its standard V.90 protocol, the industry typically referred to it as V.PCM. This name is fading from use.

V.90 technology allows users to connect to the Internet at rates up to twice as fast as those of V.34 (33.6Kbps) modems. The maximum receive (downstream) rate is 56Kbps, while the return path (upstream) connects at V.34 rates up to 33.6 Kbps. This is perfect for Internet connections, where most data is transferred downstream.

The SM56 begins connections by attempting a V.90 connection to the headend. If the headend is not V.90, the SM56 automatically switches to K56flex mode. If K56flex mode fails (when, for example, the headend uses X2 technology, or there is a noisy phone line condition), the SM56

drops to V.34 rates. This auto-mode switching mechanism ensures maximum compatibility with all remote headends.

On the Web you can visit **www.v90.com** for a wealth of information on V.90 technology, including:

- A list of ISPs that support V.90
- The latest news on V.90
- White papers on the V.90 standard
- Technology descriptions
- Frequently asked questions (FAQs)

Appendix A: SM56 Specifications

- Compatibility with Windows 95/98 communication applications
- Compatibility with communications applications that run in an MS-DOS® box -- SM56 ISA modem only
- An installation engine with country selection.
- Plug and Play operation
- Support for various data modulation modes:
 - V.90 connection rates if the headend is a true V.90 location. V.90 downstream rates to 56Kbps. Upstream rates to 33.6Kbps (V.34).
 - Fallback to K56flex® mode if the headend is K56flex, not V.90. K56flex® downstream rates to 56Kbps. Upstream rates to 33.6Kbps(V.34).
 - Connection at V.34 rates (33.6 Kbps) if the headend is not V.90 *or* K56flex®.
 - V.32bis, V.32, V.22bis, V.23, V.22/B212, V.21, Bell 103.
- Error correction - V.42, LAPM, MNP2-4
- Data compression - V.42bis, MNP5
- Fax modes supported - V.17, V.27ter, V.29
- Full voice support on Data/Fax/TAM/Speakerphone modems...where TAM is Telephone Answering Machine.
- Full-duplex speaker phone with acoustic and line echo cancellation (Data/Fax/TAM/Speakerphone modems only)
- Answering machine capability with PCM and IMA ADPCM audio formats
- Caller ID (USA and Canada)
- Distinctive Ring (USA and Canada)
- Control Panel that provides general modem information and diagnostics
- Full pulse and tone dialing and call progress monitoring
- Adaptive rate re-negotiation (up and down) during a connection to compensate for line dynamics
- Auto dial and answer
- On-line user's guide accessible through the Control Panel

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